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SUGGESTIONS FOR THE CONTROL OF THE PEA WEEVIL IN OREGON

By A. O. Larson and Frank G. Hinman,
Division of Truck Crop and Garden Insect Investigations,
Bureau of Entomology and Plant Quarantine,
United States Department of Agriculture

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Life History of the Pea Weevil

The pea weevil is widely distributed and is a common pest in most of the pea-growing sections of Oregon.

Infestation of peas with the pea weevil takes place in the field, the adult weevils laying their eggs on the surface of the developing pods. The incubation period of the egg varies greatly with the temperature, but averages about 10 days during the warmer parts of the season. Soon after hatching, the tiny larvae burrow through the pod and enter the immature peas, this activity requiring from 2 to 3 days. A small dark spot forms on the pea at the point where the grub enters. Oftentimes many grubs enter the same pea, but almost without exception only one reaches maturity. The weevil remains in the pea until the adult stage has been reached. The time necessary for the development from egg to adult varies also, and 2 months or more may be required. The emergence of the adult weevil from the mature pea may take place shortly after the peas ripen, or the weevil may remain in the dry pea over winter and emerge the following spring as soon as temperatures become favorable. If the stored peas remain undisturbed, some of the weevils fail to emerge and remain alive in the peas over the second winter. These weevils are capable of laying large numbers of eggs the second year.

Observations have shown that the peas in the first pods to form on the vines are more generally infested than the later ones on the same vines. This is due to the fact that the weevils have a longer time in which to enter the peas. Since it requires about 10 days for the egg to hatch and 2 to 3 more for the weevil to find its way into the pea, the older peas are naturally more likely to be infested. In general, there is only one generation of the weevil in a year in Oregon, but where a crop of early peas and a crop of fall peas are grown in the same vicinity the weevils that have matured in the early peas may infest the late crop. The winter is passed in the adult stage, either in the infested peas or under the bark of trees or in sheltered crevices. Shortly before the peas bloom, the overwintering weevils may be found in the field. As soon as the blossoms develop the weevils enter them and feed slightly upon the pollen and petals, but this feeding causes little damage.

Sources of Infestation

Since the control of pea weevils requires preventive measures, community effort is necessary in order to reduce infestations effectively. The common

sources of infestation in Oregon are: (1) Peas that are left on the ground after harvest, such as peas accidentally scattered in the normal processes of harvesting and canning; (2) peas left on the vines after the market crop has been harvested; (3) imported seed peas that have not been fumigated properly; (4) locally grown peas that are held in storage without proper fumigation; (5) peas that for various reasons have been left unharvested; (6) pea hay, containing weevil-infested peas, that is not utilized before the blooming period of peas the following season.

Control of the Weevil in Peas Grown for Seed

Control of weevils in peas left on the ground.—In harvesting the ripened peas there is usually a heavy loss of peas left on the ground in unharvested pods and as shattered peas. Such loss frequently amounts to 30 percent or more of the crop and constitutes a very important source of pea weevil infestation for the next year's crop. Many of the weevils contained in such peas escape and find hibernating quarters in sheltered places. Some of these weevils may emerge from the peas within a few days after harvest. This renders it necessary to combat them immediately. This can be done most efficiently where the pea straw left on the field is heavy enough to maintain a running fire. In such fields the burning of the pea straw on the ground will scorch the peas sufficiently to kill practically all of the weevils contained in those peas that the fire actually passes over.

Before burning is attempted, at least two plow furrows should be made around the outer edge of the field to prevent the fire from spreading to other fields. A fire permit should be obtained, and then, on a hot afternoon as soon after harvest as possible, the field should be burned, due care being taken to conduct a "back fire" near other crops and buildings.

If there is not sufficient pea straw to carry the fire over the ground or if for any other reason it is impracticable to burn it, the plowing of the field immediately after harvest will prevent the escape of the majority of the weevils. Such plowing is not so effective after the weevils have reached the adult stage, since many of them are then able to make their way to the surface after ordinary plowing.

Control of weevils in the harvested crop.—Fumigation is the most satisfactory and successful method of killing the weevils in the newly harvested crop. It is inexpensive, and if performed properly it kills all stages of the weevils in or among the peas without injuring the peas either for seed or for food. However, the fumigation of peas should not be attempted unless the peas are thoroughly dry. The peas should not contain more than approximately 12 percent moisture by weight. The fumigant to be used depends to a great extent upon the quantity of peas to be fumigated and the facilities available for fumigation. In Oregon, where the peas are fumigated during warm summer weather, either carbon disulphide or chloropicrin has given satisfactory results. Irrespective of the fumigant to be used, the entire crop should be fumigated immediately after harvest and before it is cleaned. This procedure reduces greatly the possibility of weevil infestation from the screenings as well as from unfumigated peas in the vicinity.

Fumigation with carbon disulphide.---Carbon disulphide is one of the most effective, the cheapest, and the simplest fumigant used to kill pea weevils, wherever insurance companies or other regulatory activities permit its use. The dosage (at atmospheric pressures) should be from 4 to 20 pounds to each 1,000 cubic feet of space to be fumigated, depending upon the air-tightness of the container. Under average conditions of fumigation, 10 pounds of the material should be used per 1,000 cubic feet. Large quantities of seed peas are now being fumigated in refrigerator cars or freight cars at a dosage of 15 pounds of carbon disulphide to each 1,000 cubic feet of space when the car is of average air-tightness. When the car is in poor condition, a 20-pound dosage should be used, and if in good condition so that it can be made nearly air-tight, 10 pounds is a sufficient dosage. The tighter the receptacle, the better the results that will be obtained. In estimating the quantity of carbon disulphide needed, the number of cubic feet in the container should always be measured, and not solely the space occupied by the seeds. It is better to use too much rather than too little of the carbon disulphide.

In the process of fumigation, the liquid carbon disulphide should be poured into shallow pie tins or similar shallow dishes and placed on top of the seeds to be fumigated; or the liquid may be poured or sprinkled directly upon them without danger of injury to the seed. The gas from this fumigant is heavier than air and evaporates more quickly if a large surface of the liquid is exposed to the air.

Fumigation with carbon disulphide should be conducted at or above a temperature of 75° F. It is not effective at temperatures below 60° F. Fumigation should continue from 24 to 48 hours, depending upon the tightness of the receptacle and the dosage, although most of the actual killing takes place during the first 6 to 8 hours of exposure. The germination of thoroughly dry seeds (not more than 12 to 15 percent moisture content) is not injured by this treatment and their food value is not affected.

Caution.---While carbon disulphide is a standard fumigant and has been used safely for many years by those observing proper safeguards, it must be remembered that the gas is explosive and inflammable if exposed during fumigation to fire, such as a lighted match, lighted cigar, lighted lantern, or the spark from an electric fixture.

Fumigation with chloropicrin.---Chloropicrin, one of the tear gases used in the World War, is now being utilized to some extent in the fumigation of peas infested by the pea weevil. It possesses the advantage of being noninflammable and of costing less than some of the other fumigants; and it has given effective results when used according to directions.

This gas is a deadly poison; however, it has a disagreeable and irritating effect upon the eyes and the respiratory passages, which prevents people from entering buildings or other structures where there are dangerous concentrations of chloropicrin. Moreover, the fumigated seeds must be thoroughly ventilated or air-washed before they can be handled, because traces of chloropicrin gas may be retained in the fumigated product for several days. When fumigating with this gas 1 pint (or 1.7 pounds) of chloropicrin should be used for each 1,000 cubic feet of space. The treatment should continue for at least 36 hours and it is most effective at or above a temperature of 75° F. It is not effective at temperatures below 60° F.

This fumigant should be applied by sprinkling it upon pieces of burlap sacking, or by pouring it into shallow evaporating pans. A gas mask is essential if large amounts of chloropicrin are to be used.

Chloropicrin costs from 85 to 90 cents per pound in 100-pound cylinders, not including the cost of transportation.

Early harvesting as an aid in controlling weevils.---Because of the rapid development of the weevils in the peas during the hot summer weather, the crop should be harvested as early as possible. Early harvest allows time for fumigating the crop while many of the weevils in the peas are still small and before such weevils have fed extensively on the interior of the peas. Also, the practice of early harvesting allows time for burning or plowing the fields before the weevils have emerged from the peas. The efficiency of fumigation, burning, and plowing as measures for the control of the pea weevil is greatly increased if the crop is harvested before many of the weevils have emerged from the peas.

Weevils develop in pea hay.---Peas grown for forage sometimes constitute an important source of pea weevil infestation. Even if the peas are cut for hay while the pods are immature, many of them are suitable for the development of weevils. The hay furnishes a favorable place for the weevils to hibernate and many of them remain in the pods until the hay is fed to livestock or otherwise utilized. Therefore, all pea hay within a pea-growing district should be used or destroyed before the peas come into bloom.

Control of Weevils in Cannery Peas and in Peas Grown for the Green-pea Market

The following methods are recommended for the control of weevils in green peas and in cannery peas:

Plowing under the plant material left on the field.---In the process of harvesting peas for the cannery a heavy loss of pods occurs frequently. The green pods are left scattered over the ground. In some instances 20 percent or more of the crop is left on the field. If these scattered pea pods are allowed to remain on the soil surface the contained weevils develop and emerge. The danger of infestations from these weevils can be eliminated by plowing or disking the peas under so that they will decay before the weevil larvae have completed their development.

Destroying peas and vines by burying, burning, or feeding them to livestock or by allowing them to decay.--At the vinery there is also a loss of peas in which pea weevils may develop. All vines and peas left in the vicinity of the vinery should be utilized by being fed to livestock or otherwise disposed of so that the weevils will not be allowed to develop. They may be used for ensilage, or may be plowed under cleanly and deeply, followed by harrowing to close crevices between clods, or they may be placed in a pile and kept sufficiently moist so that they will soon decompose.

If the crop is grown for the green-pea market, or for home consumption, the vines should be destroyed as soon as possible after the last picking of the pods. Frequently the vines are left standing in the field, after the close of the harvest period, with sufficient peas on them to produce large numbers of weevils. The method of disposing of such peas depends upon local conditions, but they should not be permitted to stand long enough to produce a crop of weevils. In general such peas should be utilized or destroyed by the methods indicated in the preceding paragraph.

Fumigation of imported dried peas.--All dried peas imported into a canning area should be fumigated at the point of origin. If this has not been done, and living weevils are found in dry peas imported into a canning area, such peas should be fumigated before being distributed or planted.

Avoid growing cannery peas and seed peas in the same district.--Cannery peas are more likely to be infested if they are grown in a seed-producing district where the weevil is destructive. Similarly, the growing of peas for seed in a pea-canning district may increase infestations in the cannery stock.

Canning or marketing as few of the older peas as possible.--To prevent the inclusion of weevils in cannery peas, the crop should be canned at such a time that it will eliminate the majority of the older peas from the pack, since these older peas are likely to be more heavily infested than the younger and more succulent ones. Likewise, if the green peas are picked when young, fewer weevil larvae will be found therein.

Other precautions.--Of course the prompt fumigation of all dried peas imported into a pea-growing district and the early disposal of any pea hay that may be present are likewise important preventive measures in a district devoted largely to the production of canning peas.

